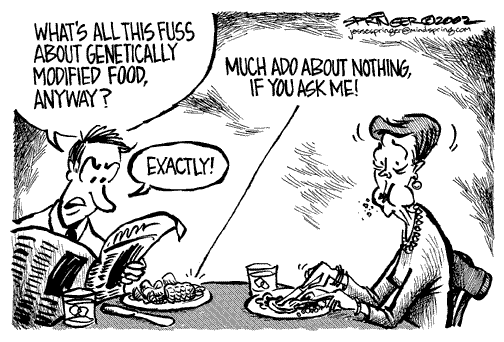
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| --- | --- | --- | --- |
| **Unit and Title of Lesson: Grade 11 Biology – Evolution… Genetically Modified Foods: Good or Bad?** | | | |
| **Curriculum Connections**   |  |  | | --- | --- | | **Materials**   * Computer/projector * Chart paper * Markers * Textbooks | **Include in Appendix**  **I.** Cartoons/comics  **II.** Student hand-out  **III.** Student discussion worksheet  **IV.** Debate Assignment and rubric |   **Big Ideas**   * Technology that enables humans to manipulate the development of species has economic and environmental implications   **Overall Expectations:**  **C1.** Analyse the economic and environmental advantages and disadvantages of an artificial selection technology…  **Specific Expectations:**  **C1.1** analyse, on the basis of research, the economic and environmental advantages and disadvantages of an artificial selection technology  **Learning Goals… Students will:**   * Be able to clearly define GMO and GMF * Know the types of genetic modification done on foods * Start to realize the positive and negative aspects of GMFs (to be furthered through debate research and prep) | | | |
| Time: 15 minutes | **Activate Prior Knowledge:**  **Before: Minds On**   * Introduce the GMF comic strips/cartoons (one at a time) on projector/computer. * **Think-pair-share:** Ask students “what is going on in the picture?” “what is the author trying to say?” “why is this humorous?” * Discuss the comics as a class. What do they tell us about what a GMF is? What do we know about GMFs? What do we *need* to know to understand these cartoons? | **Rationale for choice of T/L Strategy:**   * Assesses prior knowledge and readiness * Allows peers to share basic understanding * Make connections between prior knowledge and new knowledge that is to be learned * Allow students to explore what they don’t yet know/understand * Introduce the topic of the lesson in an interesting/engaging manner | **Assessment Strategies: AaL** – students are discovering what they already know/understand about the topic, **AfL** – teacher pays attention to what studnets know/believe about GMFs |
| **Time: 30 minutes** | **The Topic:**  **During: New Concept**   * Hand-outs: ‘What are we eating?’ and ‘discussion questions’ * (*15 min*) Have students discuss the questions in groups of 3-4 but answer individually on their sheets – *to hand in to teacher* * (*15* min) In group: brainstorm using chart paper – what are the advantages of GMFs and what are the disadvantages? (can use points from ‘discussion questions handout’); Instruct students: ‘think about various dimensions, i.e. economics, health, environment…’ | **Rationale for choice of T/L Strategies:**   * Allow students to communicate and discuss * Allow students to support each other * Allow students to construct new knowledge * Allow teacher to identify and challenge student misconceptions * Allow students to develop concepts using higher order thinking skills * Allow teacher time to interact with students, differentiate and assess for learning | **Assessment Strategies:** **AfL** – teacher will look over work to assess understanding of current topic, and will view charts - do students understand how to use information to argue for their side of things? **AaL** – provided with checklist and rubric for debate  **Differentiated Instruction:** cooperative learning and group work |
| **Time: 15 minutes** | * (*15* min) display the ‘advantages/disadvantages’ charts on the wall, allow students to give short 1-2 minute overview of their ideas to class   **After: Consolidation**  **& Connection** | **Rationale for choice of T/L Strategy:**   * To allow students to recall and review learning * highlights to increase retention * To assess for learning for Next Steps * To allow students the chance to assimilate today’s lesson and practice summarizing relevant information * Assessment for learning to ensure Learning Goals have been achieved – have students understood what a GMF/GMO is? |
| **Time: 15 minutes** | **Next Steps:**  (*10* min) Introduce debate assignment: Students will be completing a debate on one of the listed topics about GMFs (in 4 assigned groups)  **Next Steps**  - Questions and Rubric provided; debate prep period in 2 days to allow better understanding of process and what’s expected – give this time for students to start discussing/organizing their debates  **Home-fun:**  Brainstorm on your own 1-2 points that you might use to argue your side of the debate. Do some research to find supporting evidence. Write down what you find to show your partners (including where you found it) | **Rationale for Choice of T/L Strategy:**   * To allow time to explain the assignment and some time for students to prepare/organize * To encourage critical thinking, i.e. what can I use that will forward my side of the debate? |

**Before: Minds On**

Appendix I

Cartoons to be shown to class (in order)



Appendix II

**Genetically Modified Foods: What are we eating?**

**What does Genetically Modified mean?**

Genetically Modified Organism (GMO) refers to a living organism that has had changes made to its DNA. Such organisms are not found naturally in the world. This is done by using *genetic engineering techniques*, where some genes from one organism are transferred to a non-related species.

**What about Genetically Modified Food (GMF)?**

Genetic engineering can also be used on plants and so *‘transgenic’* crops can be created, such as corn, rice, or tomatoes. Different advantages can be transferred to these plants, such as pesticide resistance, high levels of vitamins, or bigger size.

Could there be disadvantages to this?

**Are GMFs safe?**



The government regulates GMFs according to vigorous risk assessments for human health and the environment. The Health Canada Website describes every GMF that is deemed safe for the public though the Canadian Government does not require these foods to be labelled unless there is a specific health risk. If a company labels their food as genetically modified, it is done voluntarily.

For the most part GMFs are considered safe to consume, however there are arguments that the long term effects of such food on the human body are not truly known.

**What are some of the modifications made to plants?**

Do you understand all of this? What about the vocabulary?

If not, check with your peers or look in your textbook.

If you’re still not sure, ask your teacher!

* Pesticide or Herbicide tolerance
* Resistance to plant diseases or insects
* Added nutritional value (such as an increase of vitamin already present or adding different vitamin entirely)
* Enhancing the size or taste
* Increase the ability to grow in traditionally ‘bad’ environments (such as soil with high salinity)
* Decrease the maturation time of the plant

**Why do this at all?**

By reducing the difficulty of growing crops and increasing overall crop yield, companies or farmers can do so with less money. This translates into providing cheaper product for the consumers. There are also arguments that GMFs can increase nutrition.

However, there are also potential downsides…

Appendix III Name:

**Genetically Modified Foods**

**Discussion Questions**

In your group, discuss the following questions. Then write down your answers in your own words.

1. Are Genetically Modified Foods also Genetically Modified Organisms? Explain.
2. Think of some GMFs that you eat regularly. List three. Beside each, state how you know that it is genetically modified.

1

2

3

1. Are pure-bred dogs GMOs? Why or why not?
2. What could be the ‘downsides’ that the last line of the hand-out refers to? Think of at least one for each of the following headings:

Economics

Health

Environment

The Plants (**hint:** are there any dangers to having a mono-culture, where all the plants have the same genetic code?)